



Delaware Source Water Assessment and Protection Program

**2003 National Source Water Protection
Conference**

Washington, D.C.

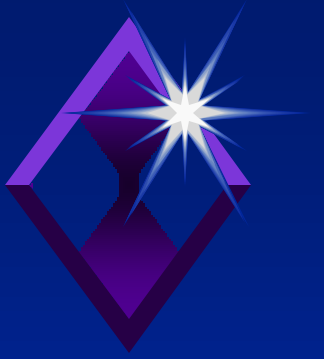
06/02/03

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Summary of Presentation

- Overview of Delaware SWAPP
- Existing Source Water Protection Activities
- Utilization of GIS and Related Databases



I. Overview of Delaware Source Water Assessment and Protection Program



Purpose of Delaware Source Water Assessment and Protection Program

- **Determine the Susceptibility** of Public Drinking Water Systems to contaminants

[Note: Vulnerability = intrinsic to well or surface water intake; Susceptibility = Vulnerability x Discrete or Non-point sources in SWA or contaminants detected in untreated water]

- **Promote** measures that provide for long-term **Protection** and assurance of safe sources of drinking water
- Assure **Public Awareness and Involvement** in protection of sources of public drinking water



Components of Delaware Source Water Protection

- Public Involvement in Development of the Source Water Assessment Plan - *Citizen and Technical Advisory Committee*
- **Delineation / Mapping of Source Areas for Public Drinking Water Supplies*** - *~586 PWS Systems with ~1,000 wells and 6 surface water intakes*
- **Identification of All Existing or Potential Sources of Contamination within Source Area*** - *DNREC Site Index Database*
- **Determination the Susceptibility of Public Water Wells or Surface Water Intakes***
- Public Notification of Susceptibility Determinations - *Consumer Confidence Reports; SWAPP Web Site; CTAC Meetings*

* **Components of Source Water Assessment Reports**



PWS Locations

- GPS Locations Obtained for:
 - ⦿ **6 Community Surface Water Intakes**
 - ⦿ **581 Community Public Wells**
(e.g. municipalities, housing developments)
 - ⦿ **171 Non-Transient Non-Community Wells**
(e.g. schools, daycare)
 - ⦿ **299 Transient Non-Community Wells**
(e.g. restaurants, campgrounds)



Contaminant Inventory (Point Sources)

- Unregulated Hazardous Sites (CERCLA/HSCA)
- UST / LUST
- Landfills
- NPDES
- Tire Piles
- Hazardous Waste Generators
- TRI Facilities
- Salvage Yards
- Pesticides - S,M, & L
- Large On-Site Septic
- Domestic Septic Systems
- Waste Water Spray Irrigation
- Waste Sludge Application
- Animal Feedlot Operations
- Combined Sewer Overflows
- Dredge Spoils
- Golf Courses



Land Use Inventory (Non-Point Sources)

- Residential
- Commercial
 - Vehicle Operations
 - Junk/Salvage Yards
- Industrial
- Transportation
 - Highways/Parking Lots
 - Railroads
 - Airports
- Utilities
- Combined Urban
- Recreation
- Cropland
- Farmsteads
- Rangeland/Pasture
- Forest Land
 - Clear-cut Forest
- Wetlands
- Barren/Open
- Extraction



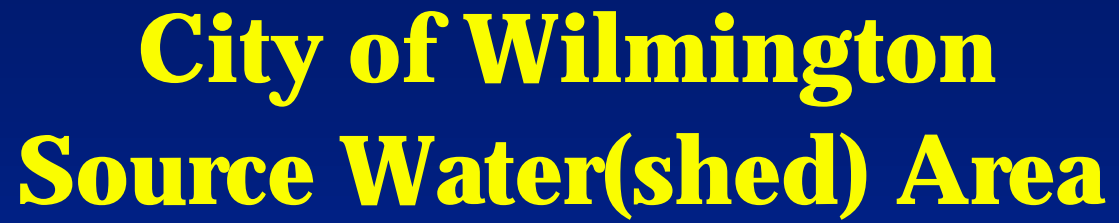
Consideration of Analytical Data from SDWIS and Special Studies

- Prior 5-years of analytical data considered
- Untreated water samples
- Recent PWS-specific water quality studies
- Analytical data used as a “trump” card for adjusting well susceptibility findings
- Interdepartmental coordination critical and still evolving (DNREC/DHSS)

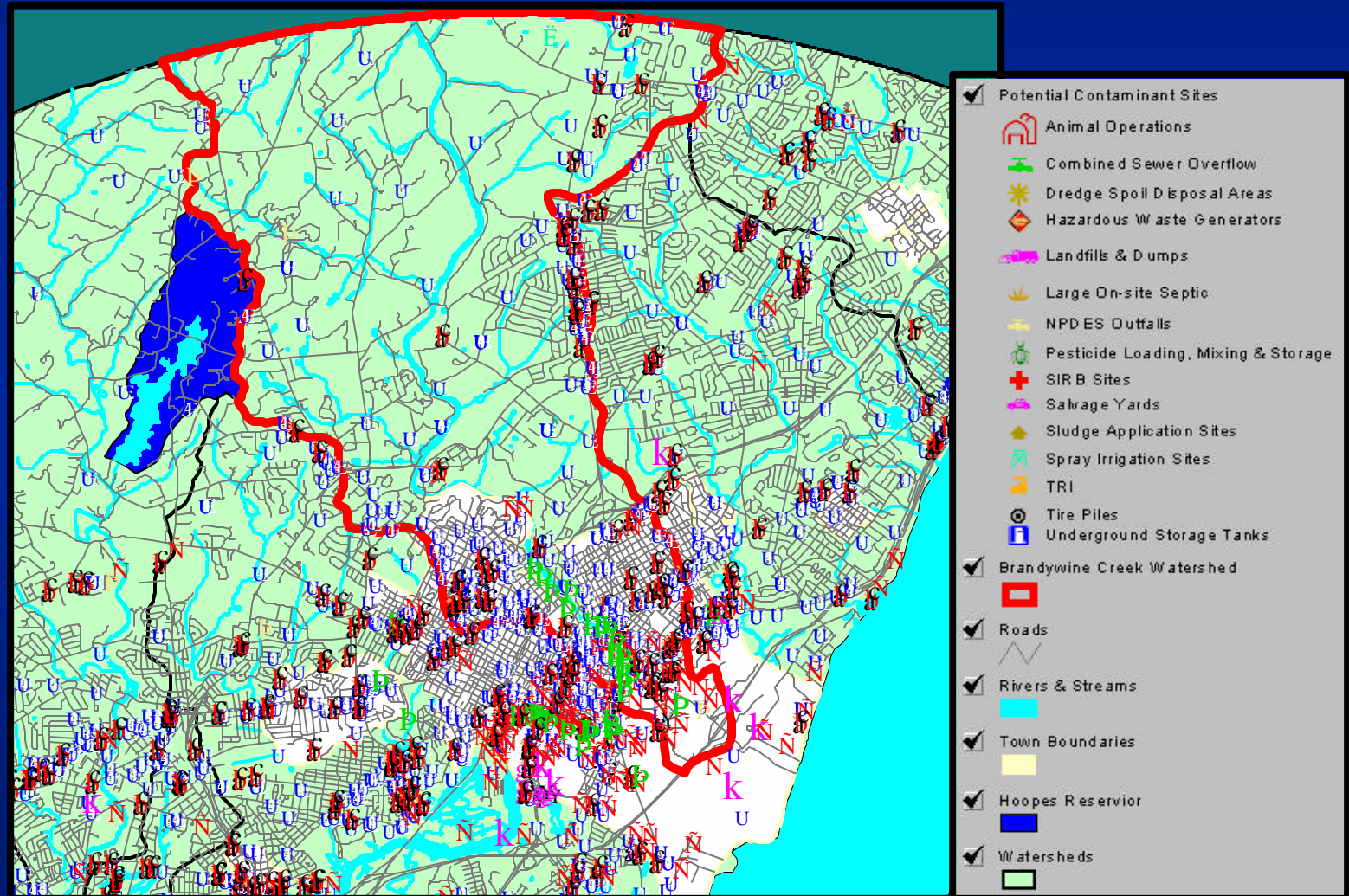


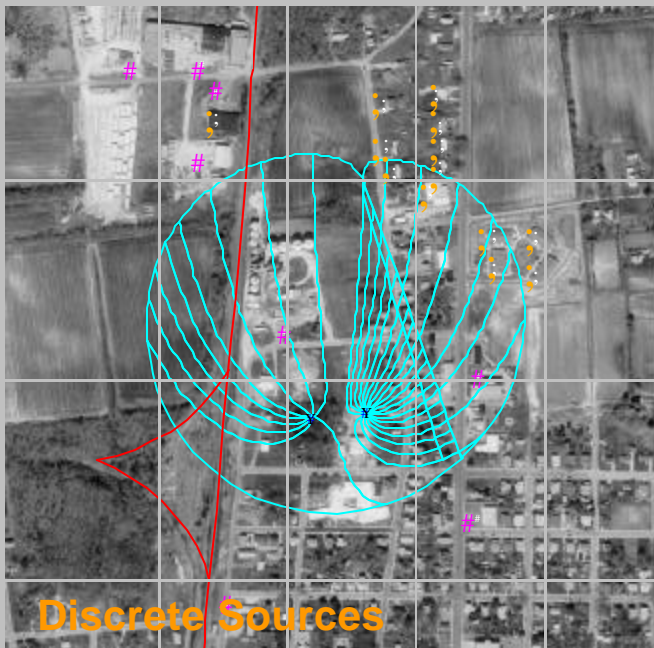
Assessments for Public Water Systems using Surface Water

- City of Wilmington – Draft Assessments for Brandywine and Hoopes Reservoir near completion
- City of Newark – Draft of Assessment for White Clay Creek near completion
- United Water Delaware – Draft Assessment for Red Clay/White Clay Creeks near completion
- United Water Delaware – Christina River (above Smalley's Pond) - draft assessment near completion



Potential Contaminant Sites in the Brandywine Watershed





**MOST
SUSCEPTIBLE**

**MODERATELY
SUSCEPTIBLE**

**LEAST
SUSCEPTIBLE**

7

6

5

4

3

2

1

**Nutrients
Pesticides**

**Petroleum Hydrocarbons
Other Organics
Other Inorganics
Metals**

**Pathogens
PCBs**

MEDIUM TOWN EXAMPLE ASSESSMENT SUMMARY

Is It
Surface Water/GWUDI¹
or Ground Water?

Ground
Water

What is the
Well Integrity²?

Good

Is the Well in Piedmont
or Coastal Plain?

Coastal
Plain

Is the Well Unconfined?

Yes

Is the Well Screen
<100' deep?

No (Deep)

Medium Vulnerability



II. Summary of Delaware Source Water Protection Activities



Existing Source Water Protection Measures

- Numerous regulatory programs (UST, Solid Waste, Pesticides, etc.) have specific protection measures that address public drinking water sources —*DNREC compendium of existing authorities*
- Prioritization of sites by regulatory programs (e.g. *remediation of sites or BMP's for NPS problems*)
- Review of all water well permits (*public and domestic*) for proximity to sources of contamination
- Regulation of Public Water Systems by Department Health and Social Services – *Sampling and treatment*
- Delaware Source Water Protection Legislation (2001)
- Water Treatment measures taken by Water Suppliers



Compendium of Existing Federal, State, and Local Authorities

- Federal (e.g. CERCLA/SARA – may be used as ARAR's for remedial goals)
- State (e.g. UST policy for secondary containment in wellhead protection areas)
- Local (e.g. County ordinance limiting impervious cover in source water areas)



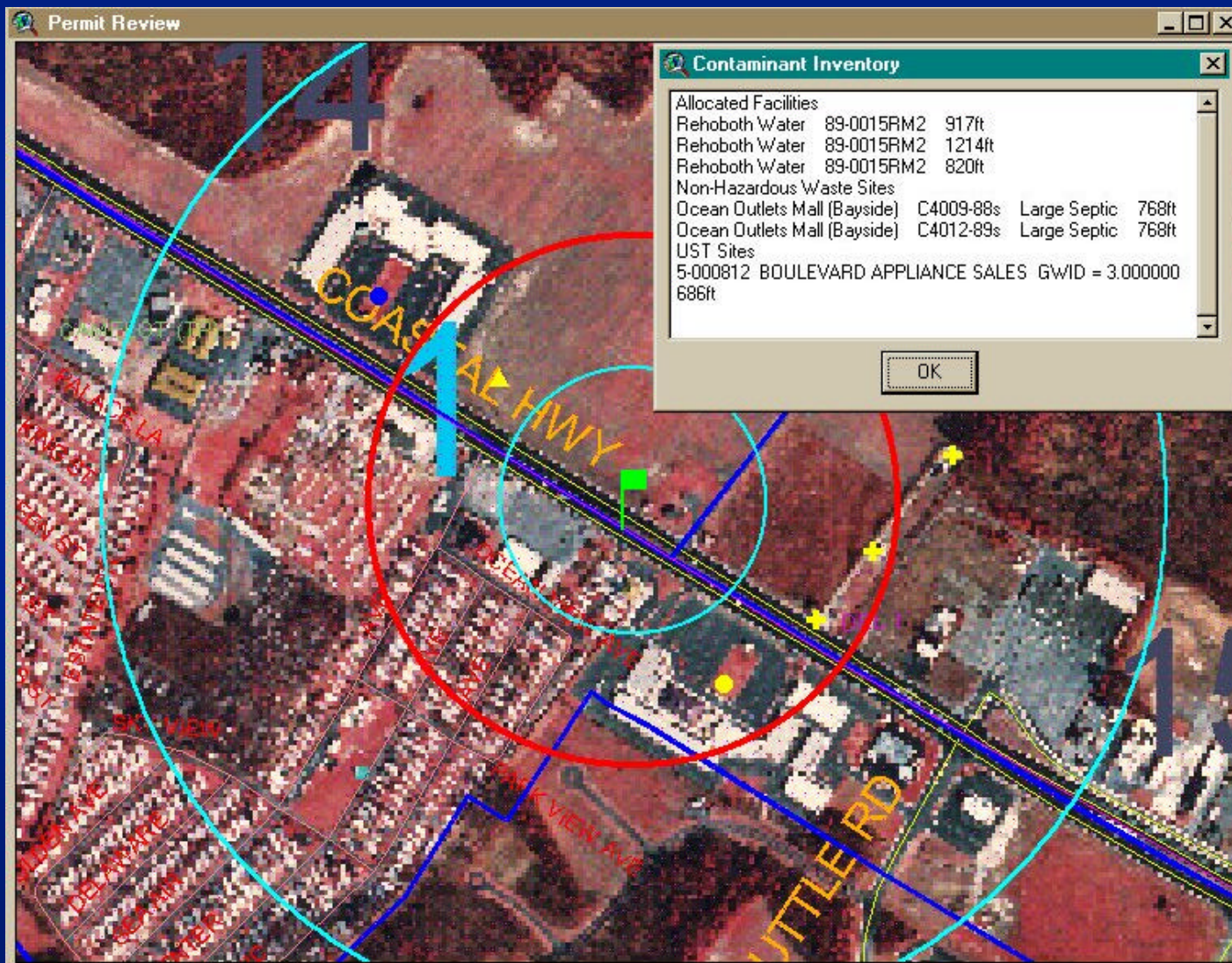
Water Well Permit Review

- All water wells require state permit
- All permits are screened against a **GIS project** prior to issuance
- **Well Permit GIS Project** * contains points or polygons for all 'known' sites – e.g. LUST, Large Septic, Wastewater Spray, NPL, State HSCA, RCRA Corrective Action, etc.
- Wells near problem sites referred to technical staff for review and special permit conditions

** GIS Project updated but currently static – DNREC developing a 'live' version termed environmental navigator with links to programs*



Water Well Permit Example





Delaware Source Water Protection Legislation

- Legislation passed by Delaware General Assembly and signed by Governor in 2001
- Schedule for consideration of critical source water areas (wellhead, source water, excellent recharge) in land use decision-making (counties and municipalities)
- Preparation of a best management practices manual by DNREC to assist local communities in protecting drinking water
- Increased representation on the Delaware Source Water Citizen and Technical Advisory Committee

Water Resource Protection Areas

Source Water Protection Areas and Excellent Ground-Water Recharge Areas in Sussex County, Delaware

Communities with 2000 or more persons (year round) based upon data from the 2000 Census:
Sussex County,
Town of Georgetown,
Town of Laurel,
Town of Lewes,
City of Milford,
Town of Millsboro, and
City of Seaford

Schedule of Source Water Assessment Completion in Delaware

Community Public Water Supplies
(municipalities / water utilities) - April 30, 2003

Non-Community Public Water Supplies
(businesses / schools) - December 31, 2003

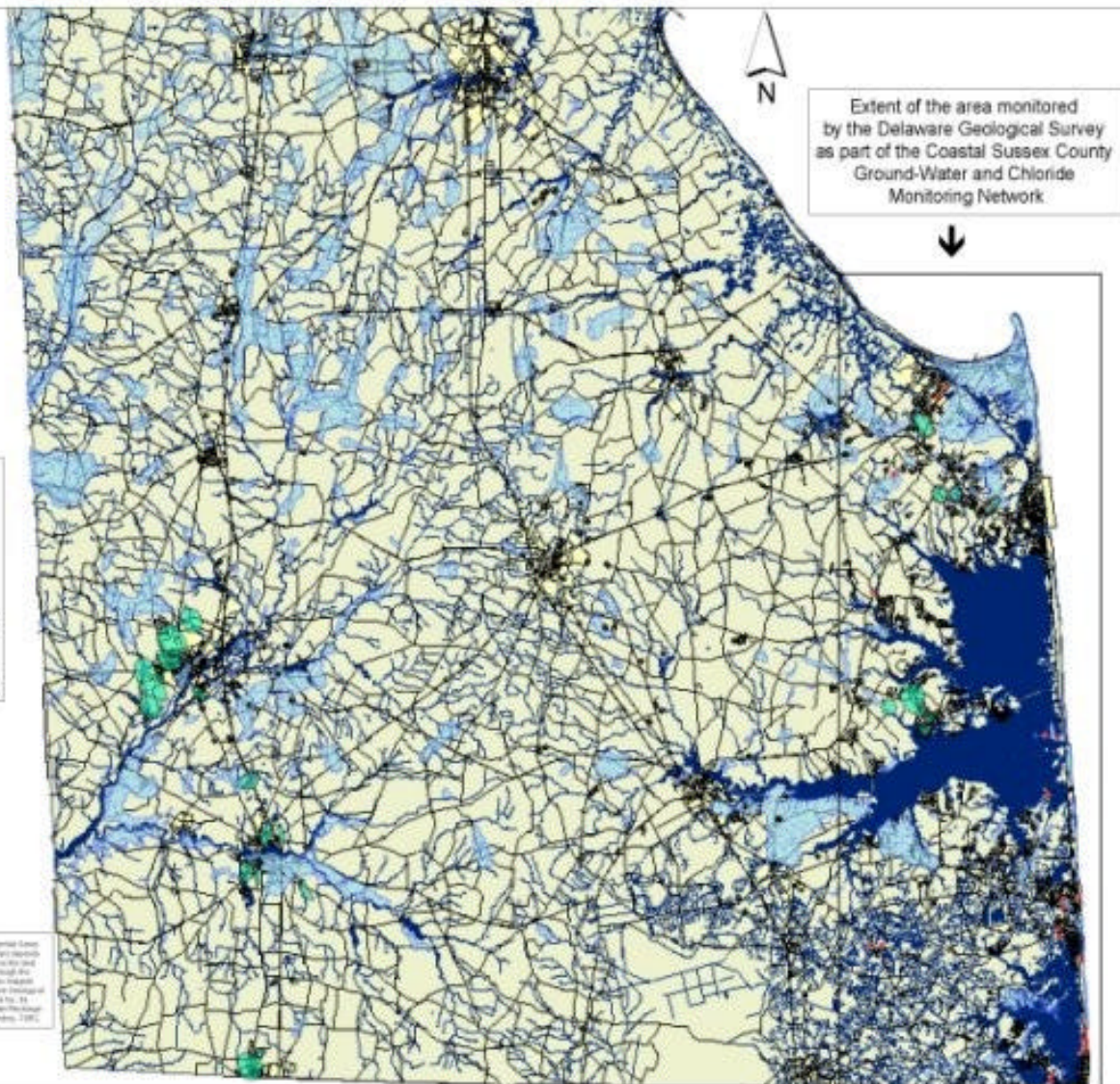
Transient Public Water Systems
(restaurants / parks) - December 31, 2003

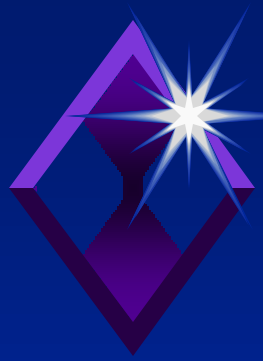
Legend

- Completed NPHL
- Sussex County Public Wells
- SD2 Safety Monitoring Well
- RECHARGE
- Excellent
- Major Roads
- Town
- Water
- State outline

0 1 2 4 8 Miles
1:100,000

Excluded: 20 miles from the edge of the state. Some areas are excluded from the map because they are not within the state boundary. The map is a general overview and does not show the details of the state boundary. The map is a general overview and does not show the details of the state boundary. The map is a general overview and does not show the details of the state boundary.



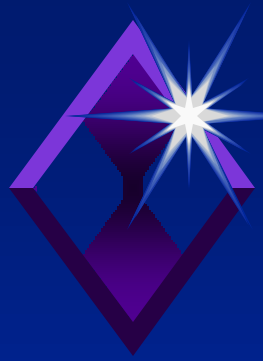


Local Governments – Counties, Municipalities

- New Castle County and the City of Newark -- address Land Use (e.g. impervious cover limits) and hazardous substance storage within wellhead protection areas
- Small Municipalities with Local Ordinances – Townsend, Delmar, Smyrna



III. Utilization of GIS and Related Databases



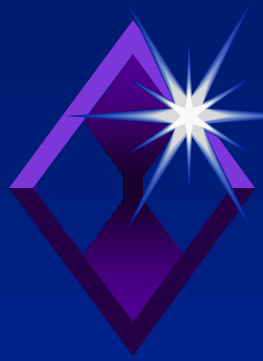
Summary of Software Tools Used for Delaware Assessments (1)

- MS Access – SWAP Database (mainly public wells data); Water Allocations database
- ArcView GIS - Points and Shapefiles for land-use and discrete sources
- Oracle - SDWIS Analytical Database
- ArcView/Access - Hydrogeologic Parameters: polygons with assigned analytical values and aquifer descriptions for entire state
- ArcView, WhAEM, and USGS Modflow – Wellhead delineations



Summary of Software Tools Used for Delaware Assessments (2)

- Special Functions Developed by DNREC staffer:
 - **SWAP Database** – Updated with SDWIS analytical data;
 - **WhAEM Wizard** – Converts ArcView GIS data from Local GIS coordinate system to UTM for use with EPA's WhAEM model;
 - **SWAP_GAS (*Geographical Analysis System*)** - Processes the available GIS Coverages and Generates 4 maps → Location, Delineation, Discrete Sources, and Land Use; Exports GIS Data as text files for ratings (land use, roads/rail, discrete sources, septic density) to SWAP database;



Summary of Software Tools Used for Delaware Assessments (3)

- **SWAP_DOctor** – Imports the text files generated by SWAP_GAS and populates the appropriate fields in the SWAP Database;
- **SWAP Report Generator** – *Delaware's Assessment Writing Tool*. Generates text, tables, and figures, including individual source and wellfield susceptibility ranking tables for final assessment reports. Allows for reports to be saved as a HTML web page for posting to the internet, printed to MS Word documents, or printed as Adobe PDF files.



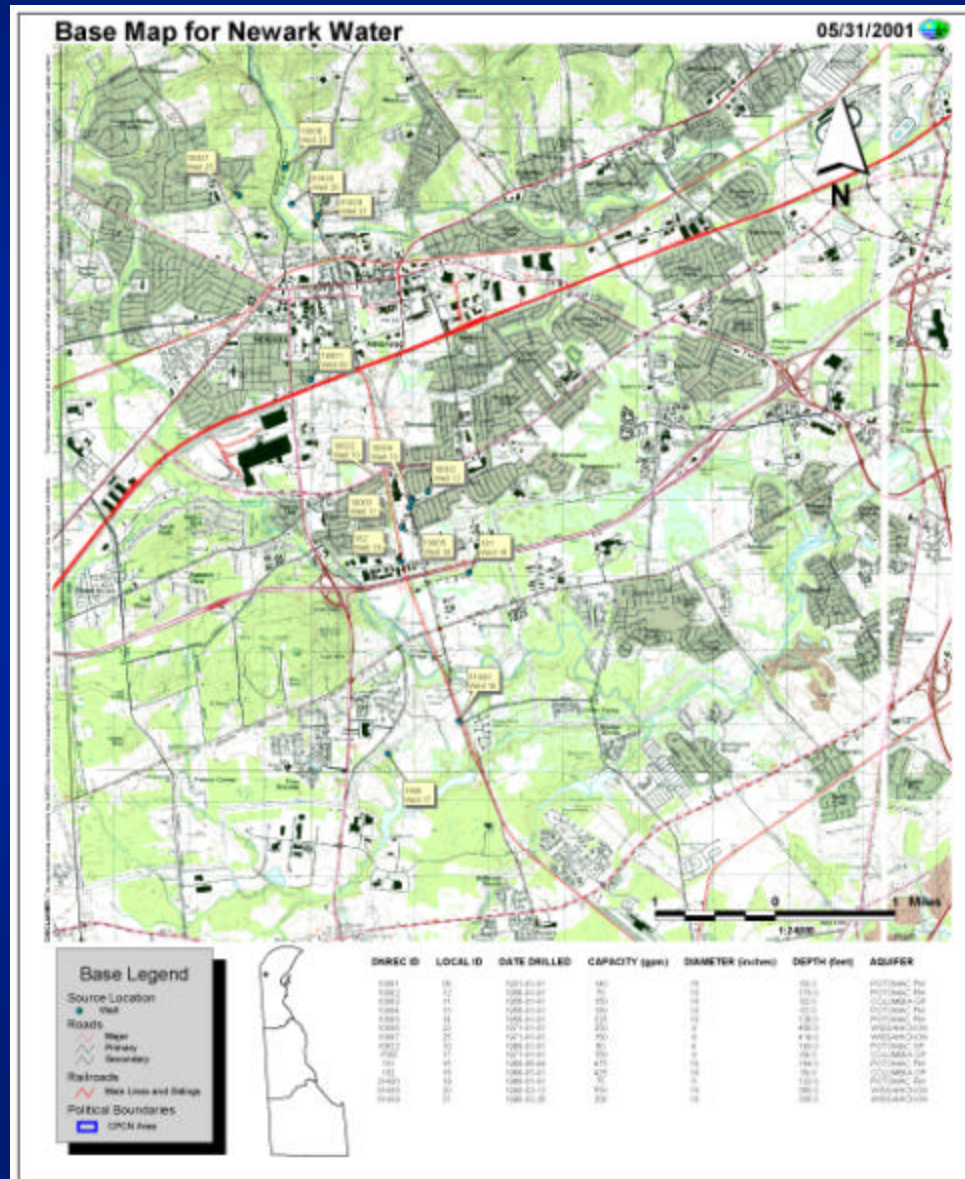
Sources of Data

Used in Generating Assessments

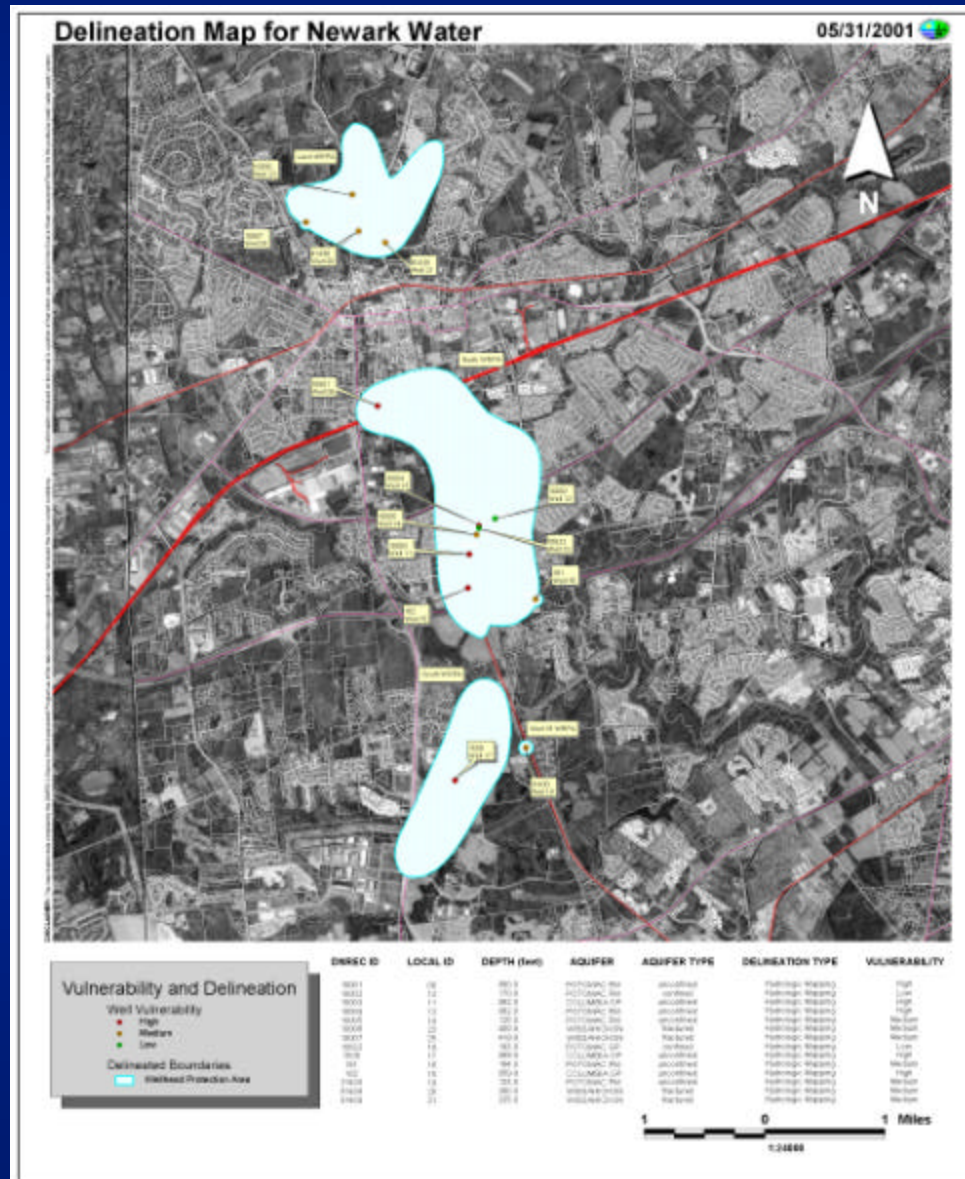
| Data Sources Used in Source Water Assessments | | | |
|--|---|--|----------------------------|
| Data Type | Organization | Section | Phone Number |
| Public Water Supply Well Data | Department of Natural Resources and Environmental Control | Water Supply Section | (302) 739-4793 |
| Public Water Supply Well Data | Delaware Geological Survey | | (302) 831-2833 |
| Water Quality Data | Department of Health and Social Services | Division of Public Health Office of Drinking Water | (302) 739-5410 |
| Land Use / Land Cover GIS Coverage | Delaware Office of State Planning Coordination | | (302) 739-3090 |
| Animal Feedlot Operations | County Conservation Districts | | Kent: (302) 697-2600 |
| | | | New Castle: (302) 832-3100 |
| | | | Sussex: (302) 856-3990 |
| Combined Sewer Overflows (CSOs) | Department of Natural Resources and Environmental Control | Surface Water Discharges Section | (302) 739-5731 |
| Dredge Spoil Disposal Areas | Department of Natural Resources and Environmental Control | Soil and Water Conservation | (302) 739-4411 |
| Hazardous Waste Generator Sites | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-3689 |
| Landfills and Dumps | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-3689 |
| Large On-site Septic Systems | Department of Natural Resources and Environmental Control | Ground Water Discharges Section | (302) 739-4762 |
| NPDES Wastewater Outfalls | Department of Natural Resources and Environmental Control | Surface Water Discharges Section | (302) 739-5731 |
| Pesticide Loading, Mixing, and Storage Facilities | Delaware Department of Agriculture | Pesticide Management Section | (302) 739-4811 |
| Salvage Yards | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-3689 |
| Site Investigation and Restoration Branch (SIRB) [Superfund] Sites | Department of Natural Resources and Environmental Control | Site Investigation and Restoration Branch | (302) 395-2600 |
| Sludge Application Sites | Department of Natural Resources and Environmental Control | Surface Water Discharges Section | (302) 739-5731 |
| Spray Irrigation Sites | Department of Natural Resources and Environmental Control | Ground Water Discharges Section | (302) 739-4762 |
| Tire Piles | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-3820 |
| Toxic Release Inventory Sites | Department of Natural Resources and Environmental Control | Air Quality Management Section | (302) 739-4791 |
| Underground Storage Tanks | Department of Natural Resources and Environmental Control | Underground Storage Tank Branch | (302) 395-2500 |



Location Map for Delaware Assessments



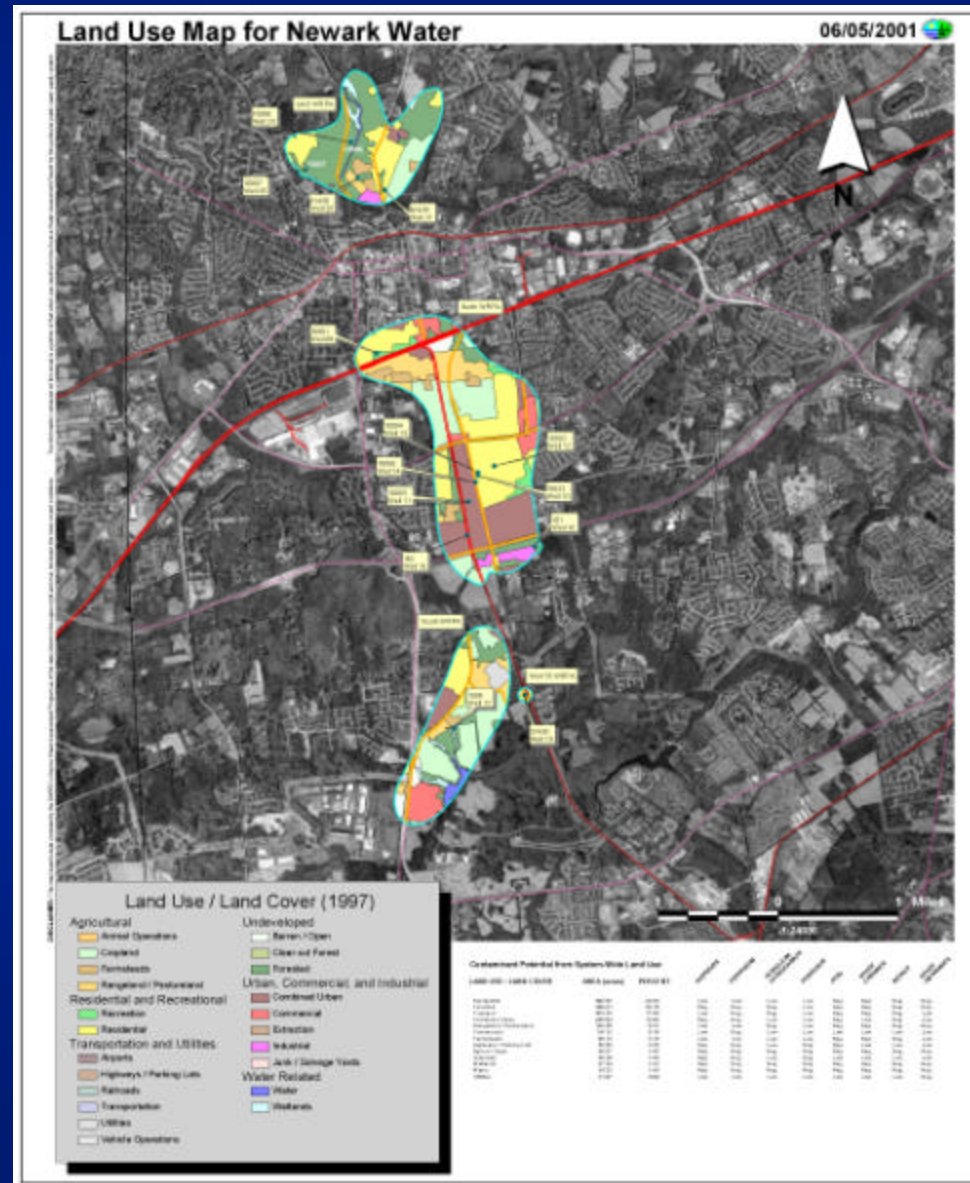
WHPA Delineation Map for Delaware Assessments

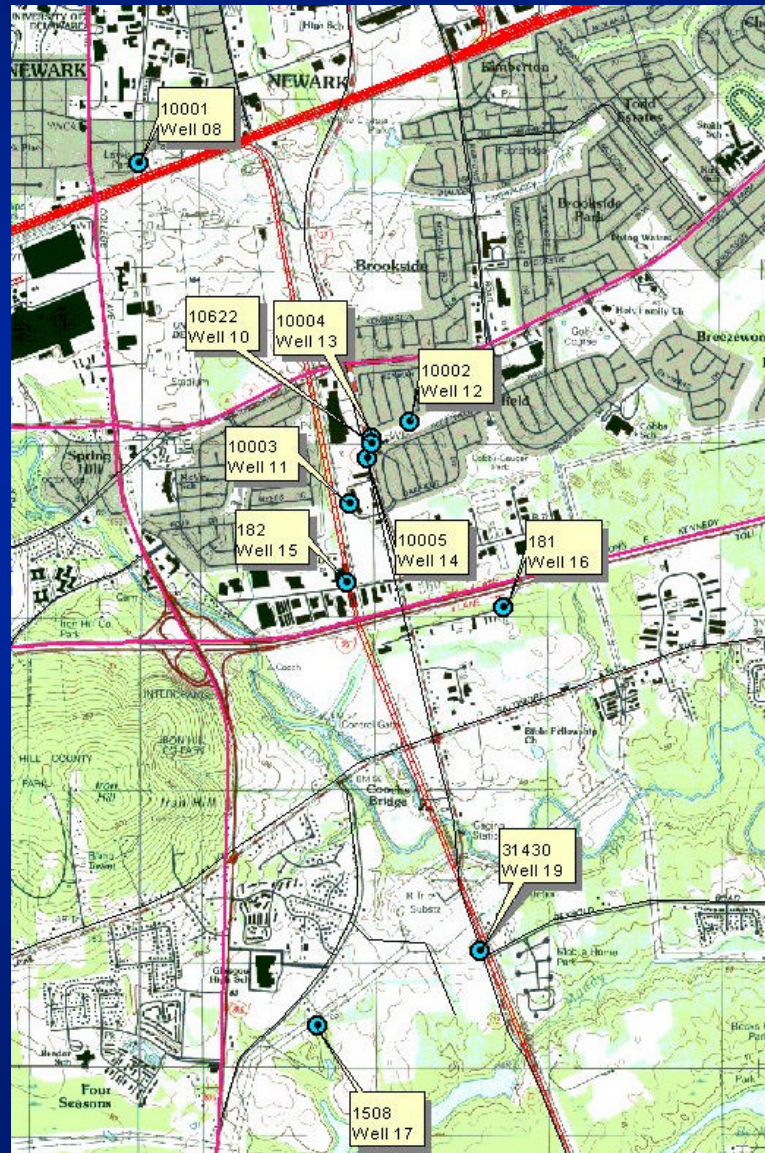




DISCLAIMER: This map depicts the completed Raritan River's Stream Rehabilitation Program as of the date shown on the upper right and does not depict the most current condition.

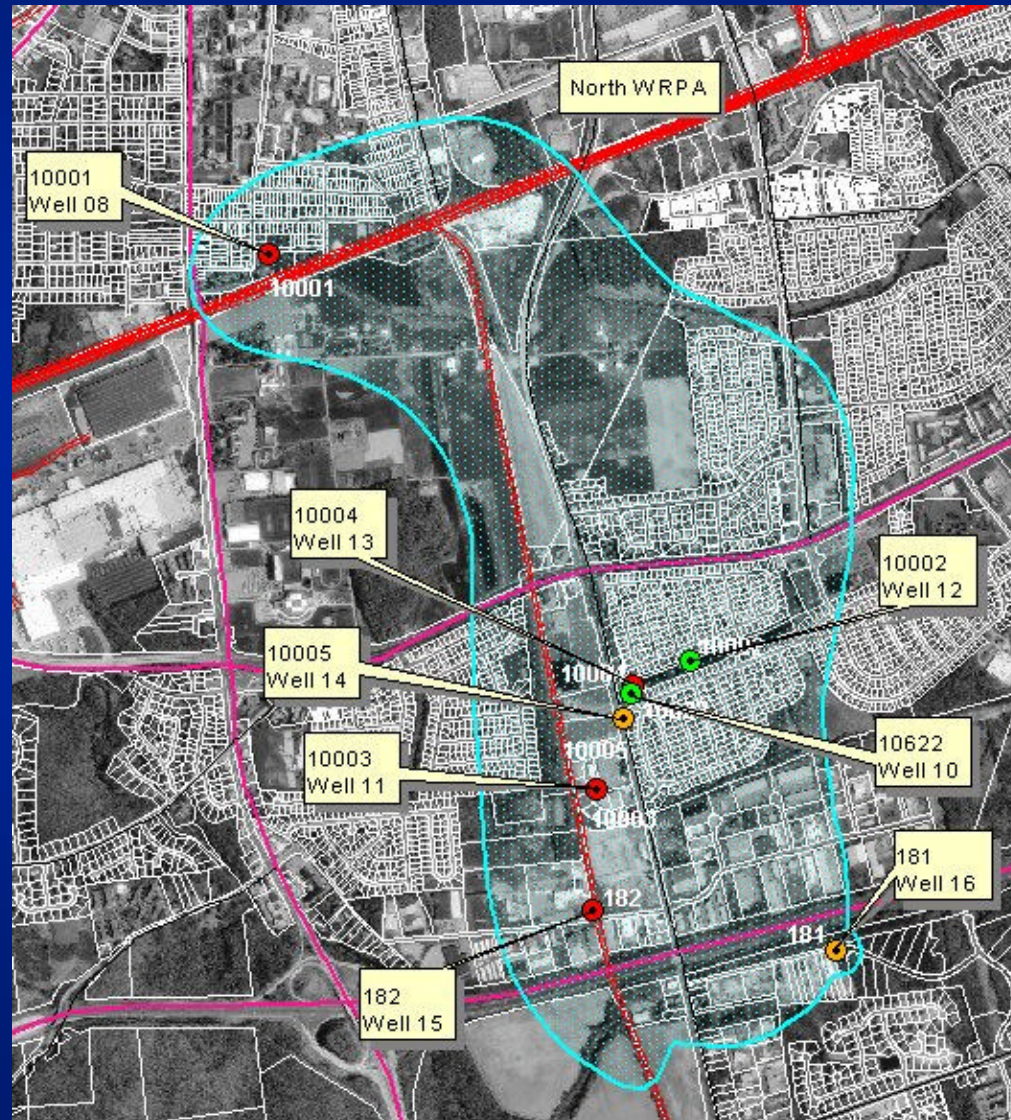
A graphic scale bar for the map. It consists of a horizontal line divided into segments. Above the line, the numbers '1', '0', and '1' are placed, representing a distance of 1 mile. Below the line, the text '1:25000' is printed, indicating the map's scale.





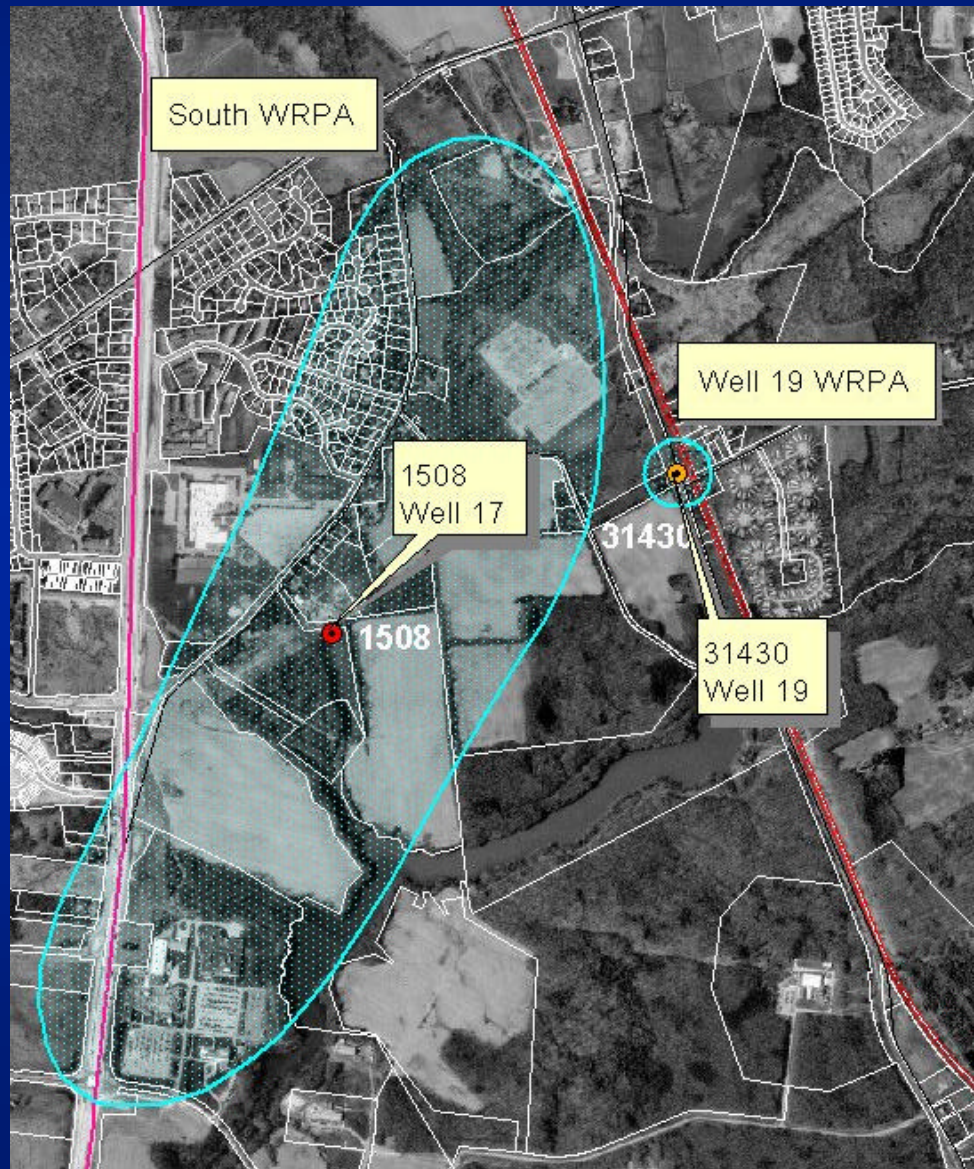


City of Newark, DE – North Wellfield WHPA



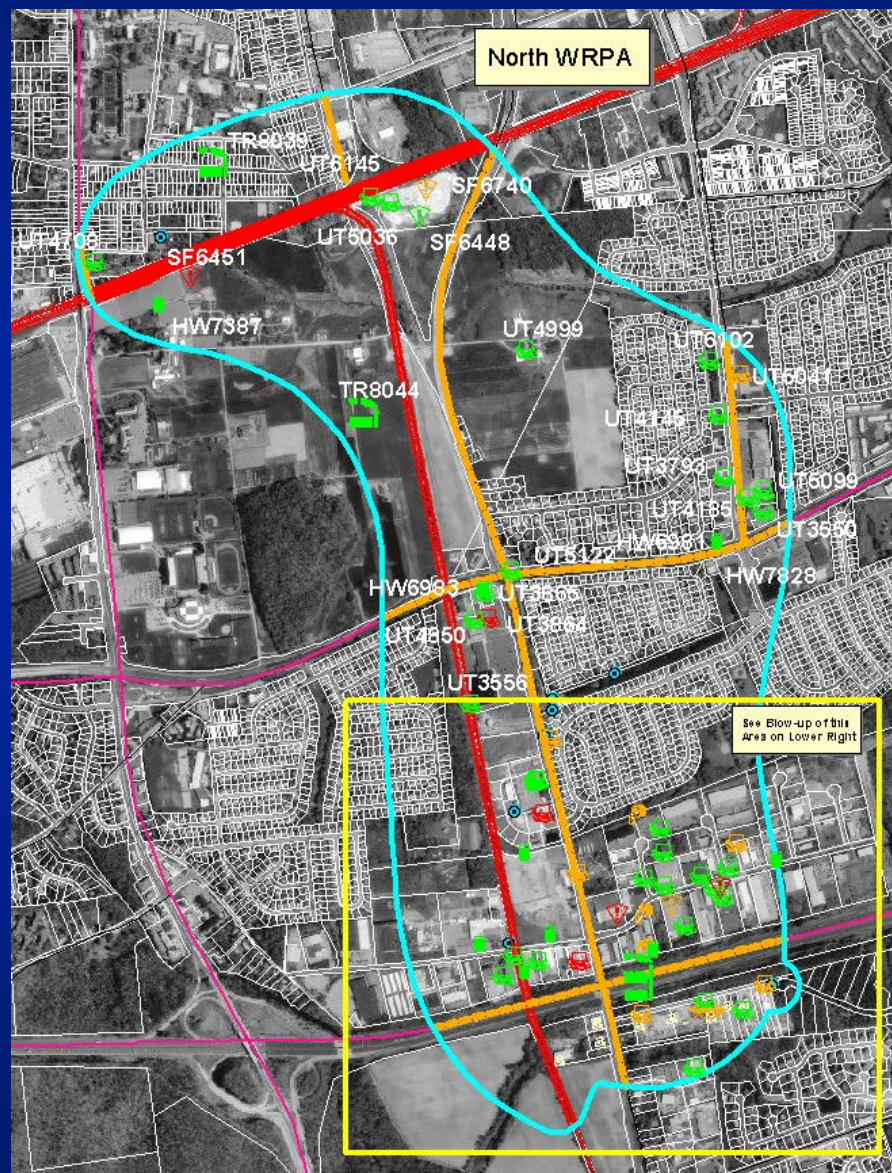


Newark, DE – South Wellfield WHPA

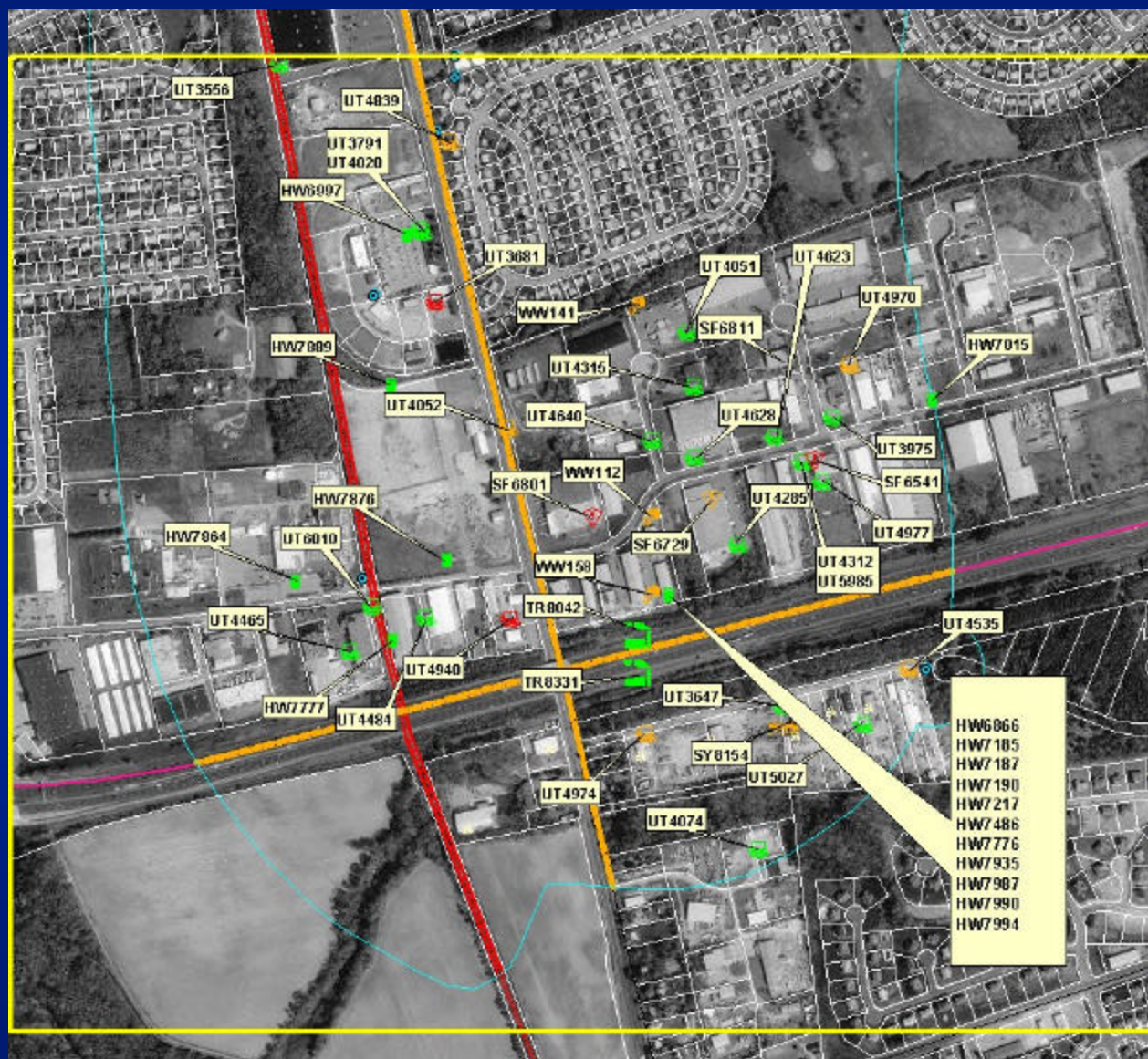


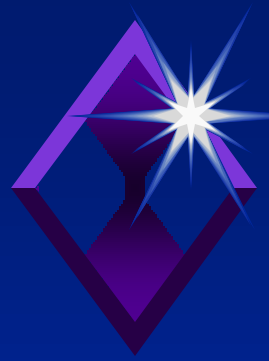


Newark, DE – North Wellfield Point Sources 1a

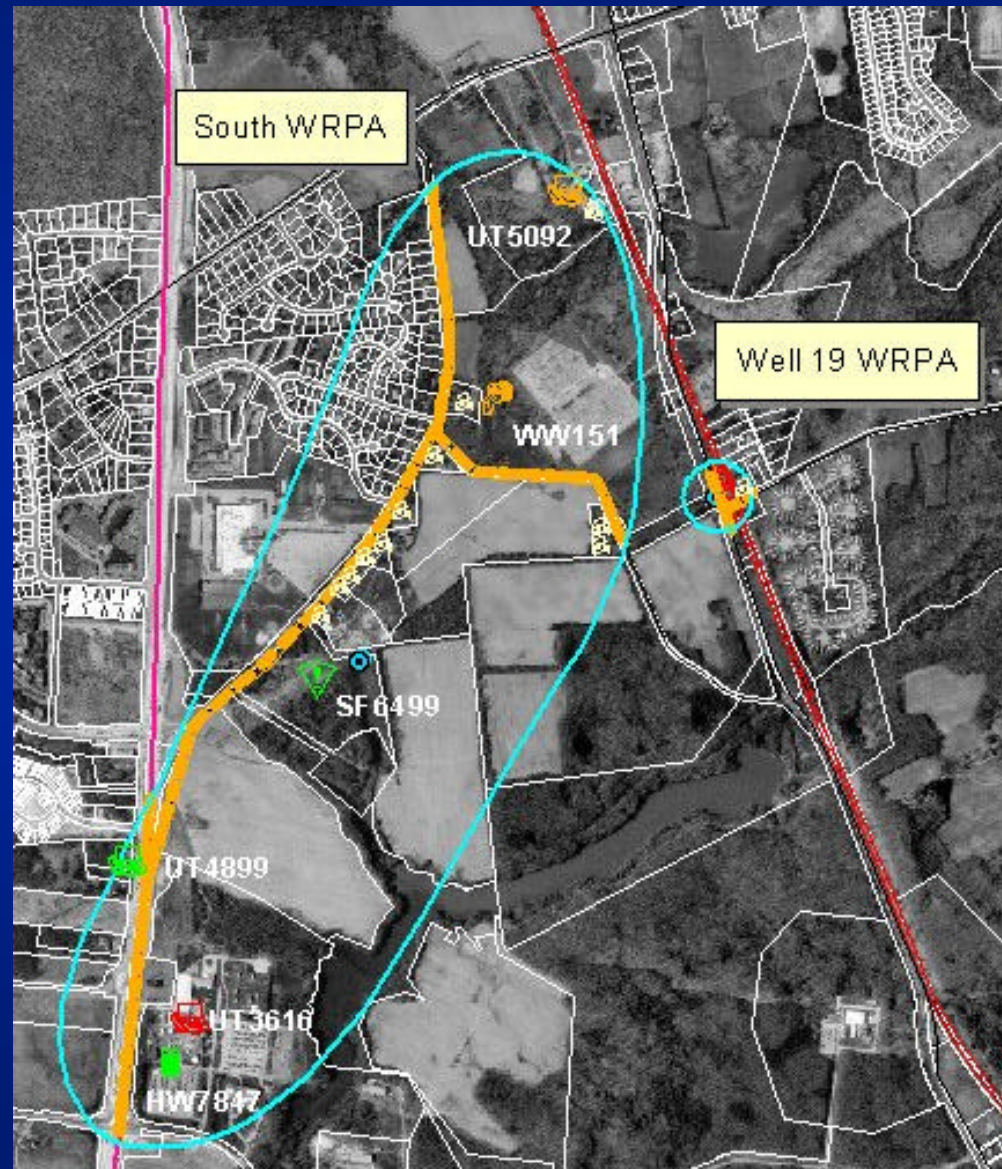


Newark, DE – South Wellfield Point Sources 1b





Newark, DE – South Wellfield Point Sources 2



Summary of Discrete Sources for Assessments

Discrete Sources

Contaminant Potential

 Outside of Area  Low  Medium  High

Site Types

| | |
|---|---|
|  Animal Operations |  Pesticide Loading, Mixing, Storage |
|  Combined Sewer Overflows |  Superfund |
|  Domestic Septic System |  Salvage Yards |
|  Dredge Spoils |  Sludge Application |
|  Hazardous Waste Generator |  Spray Irrigation |
|  Landfills |  Toxic Release Inventory |
|  Large Septic System |  Tire Pile |
|  NPDES |  Underground Storage Tank |

Sites with Large Areal Extent

 Landfills  Golf Courses

GMZs

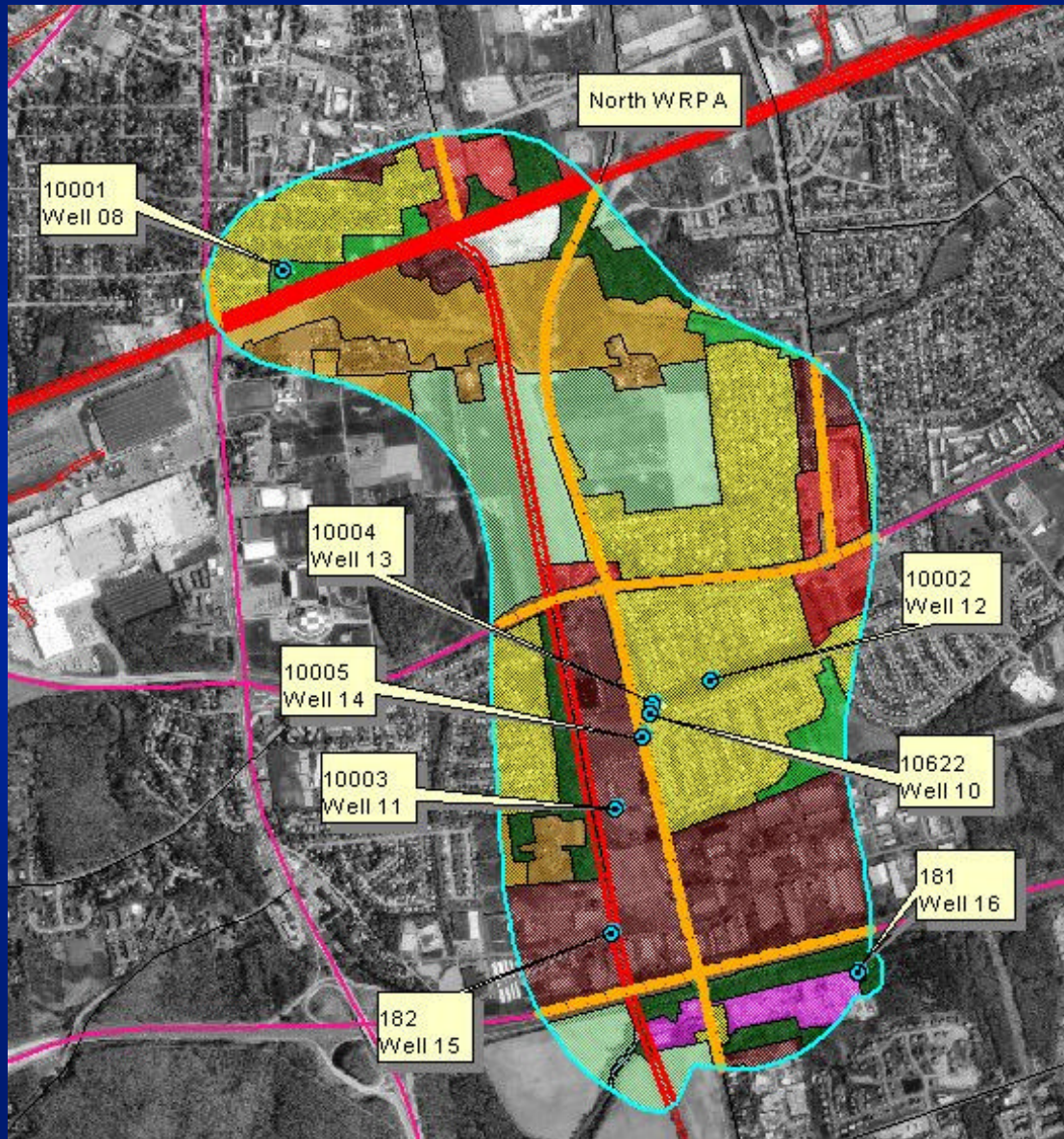
 1 Zone
 Zone A
 Zone B

Summary Table of Discrete Sources with Ratings

Contaminant Potential from Discrete Sources within Source Water Area

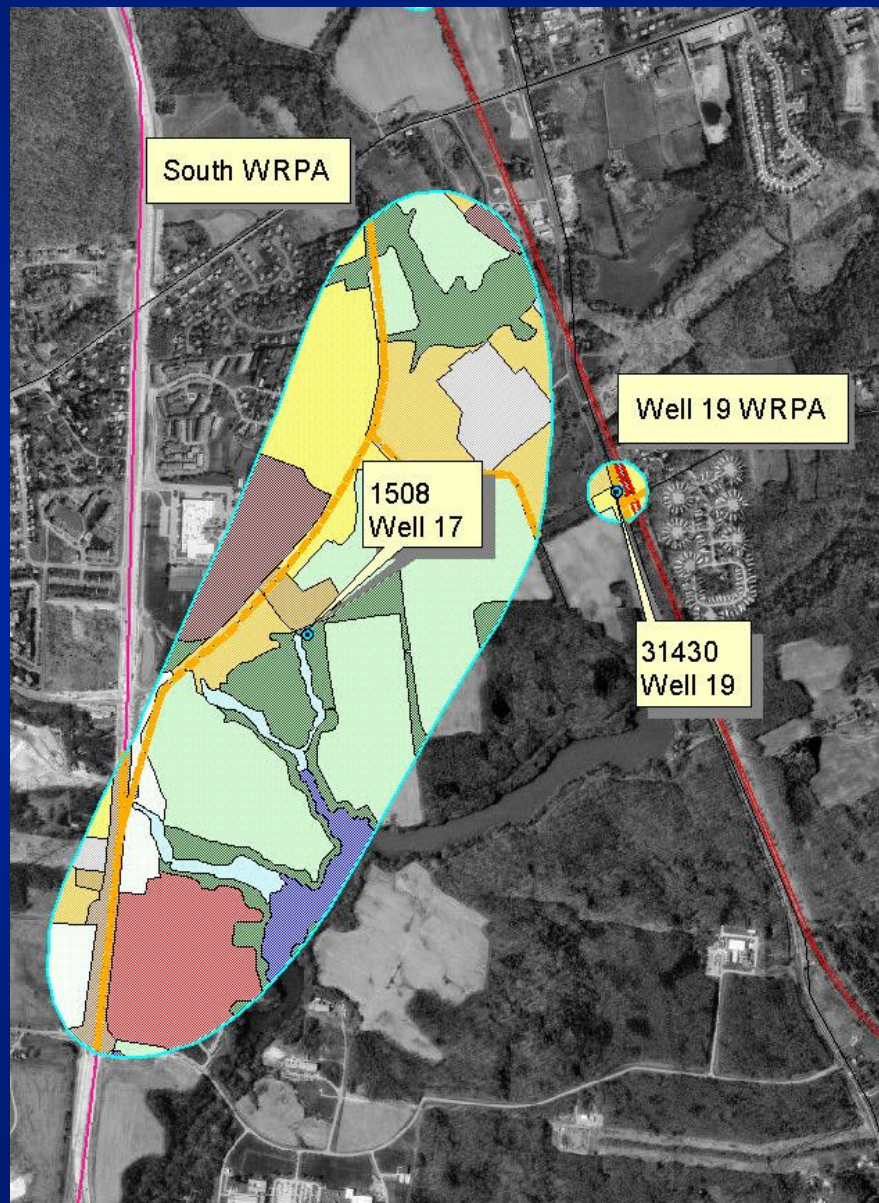
| MAP ID | SITE ID | SITE TYPE | SITE NAME | NUTRIENTS | PATHOGENS | PETROLEUM HYDROCARBON | PESTICIDES | PCBs | OTHER ORGANICS | METALS | OTHER INORGANICS |
|--------|-----------------|--------------------------------|----------------------------------|-----------|-----------|--------------------------|------------|--------|-------------------|--------|---------------------|
| HW7935 | DER00000047 | Hazardous Waste Generators | A & W Coachworks Inc. | Neg. | Neg. | Neg. | Neg. | Neg. | Low | Neg. | Neg. |
| HW7987 | DER00000130 | Hazardous Waste Generators | VTI Inc | Neg. | Neg. | Neg. | Neg. | Neg. | Low | Low | Neg. |
| HW7990 | DER00000143 | Hazardous Waste Generators | PermaFlex | Neg. | Neg. | Neg. | Neg. | Neg. | Low | Neg. | Neg. |
| HW7994 | DER00000160 | Hazardous Waste Generators | Rodel Inc Building 8 | Neg. | Neg. | Neg. | Neg. | Neg. | Low | Low | Low |
| LF24 | LF-24 | Landfills & Dumps | Curtis Paper Dump | Neg. | Neg. | Medium | Medium | Medium | Medium | High | High |
| SF6448 | DE-035 | Superfund Sites | NEWARK CONCRETE CO. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. |
| SF6451 | DE-039 | Superfund Sites | NEWARK LANDFILL | Neg. | Neg. | Neg. | Neg. | Neg. | High | High | High |
| SF6499 | DE-088 | Superfund Sites | DUPONT GLASGOW BORROW PIT | Neg. | Neg. | Neg. | Neg. | Neg. | Low | Neg. | Neg. |
| SF6541 | DE-1032 | Superfund Sites | PROCESS INDUSTRIES | Neg. | Neg. | Neg. | Neg. | Neg. | High | Neg. | Neg. |
| SF6668 | DE-1153 | Superfund Sites | CURTIS PAPER MILL - PLANT AREA | Neg. | Neg. | Low | Low | Low | Low | Low | Low |
| SF6729 | DE-173 | Superfund Sites | SYNTECH | Neg. | Neg. | Medium | Medium | Neg. | Low | Medium | Medium |
| SF6740 | DE-184 | Superfund Sites | BROOKSIDE DUMP | Neg. | Neg. | Neg. | Neg. | Medium | Medium | Medium | Neg. |
| SF6801 | DE-248 | Superfund Sites | AMP CIRCUITS | Neg. | Neg. | Neg. | Neg. | Neg. | High | Neg. | Neg. |
| SF6811 | DE-259 | Superfund Sites | NEWARK MUNITION STORAGE | Neg. | Neg. | Medium | Neg. | Neg. | Medium | Medium | Medium |
| SY8154 | SY-32 | Salvage Yards | Goodchild Inc. | Neg. | Neg. | Medium | Neg. | Neg. | Medium | Medium | Neg. |
| TR8039 | 19711CRTSD225PA | Toxics Release Inventory Sites | Crown Paper | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. |
| TR8042 | 19713DPNTP350BE | Toxics Release Inventory Sites | DuPont Pencader | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. |
| TR8044 | 19714NWRKS550SO | Toxics Release Inventory Sites | DaimlerChrysler | Low | Low | Neg. | Neg. | Neg. | Neg. | Low | Neg. |
| TR8331 | 19714WLGSR525BE | Toxics Release Inventory Sites | W.L. Gore Bellevue | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. | Neg. |
| UT3550 | 3000016 | Underground Storage Tanks | Texaco Service Station 140451315 | Neg. | Neg. | Low | Neg. | Neg. | Neg. | Neg. | Neg. |
| UT3556 | 3000022 | Underground Storage Tanks | KMART #7116 | Neg. | Neg. | Low | Neg. | Neg. | Neg. | Neg. | Neg. |
| UT3616 | 3000083 | Underground Storage Tanks | Dupont GLASGOW | Neg. | Neg. | High | Neg. | Neg. | Neg. | Neg. | Neg. |
| UT3647 | 3000115 | Underground Storage Tanks | RA BOYER Inc | Neg. | Neg. | Low | Neg. | Neg. | Neg. | Neg. | Neg. |
| UT3681 | 3000149 | Underground Storage Tanks | USA Training ACADEMY Inc | Neg. | Neg. | High | Neg. | Neg. | Neg. | Neg. | Neg. |

Newark, DE – North Wellfield Land Use





Newark, DE – South Wellfield Land Use





Summary of Land Use Types for Assessments

Land Use / Land Cover (1997)

Agricultural

-  Animal Operations
-  Cropland
-  Farmsteads
-  Rangeland / Pastureland




Residential and Recreational

-  Recreation
-  Residential

Transportation and Utilities

-  Airports
-  Highways / Parking Lots
-  Railroads
-  Transportation
-  Utilities
-  Vehicle Operations

Undeveloped

-  Barren / Open
-  Clear-cut Forest
-  Forested

Urban, Commercial, and Industrial

-  Combined Urban
-  Commercial
-  Extraction
-  Industrial
-  Junk / Salvage Yards

Water Related

-  Water
-  Wetlands

[illegible]



Summary of Delaware SWAPP

- Source Water Assessments are currently underway – *Goal is to complete all systems by December 2003*
- Priority Assessments based on system size, special requests, and contamination problems
- Certain protection measures will begin to take effect immediately – Regulatory Programs, Local Land Use, SWP Loan Fund
- GIS/ Database Automation to allow ‘real time’ availability of information from both water supply management agencies and contaminant source/ land use management agencies – Environmental navigator
- Public Distribution with FOIA requirements

